ABSTRACT:

Problem statement: Electro-hydraulic actuators are widely used in motion control application. Its valve needs to be controlled to determine direction of the motion. Mathematical modeling is a description of a system in terms of equations. It can be divided into two parts; physical modeling and system identification. The objective of this study was to obtain mathematical model of an electro-hydraulic system using system identification technique by estimating model using System Identification Toolbox in MATLAB.

Approach: Experimental works were done to collect input and output data for model estimation and ARX model was chosen as model structure of the system. The best model was accepted based on the best fit criterion and residuals analysis of autocorrelation and cross correlation of the system input and output. PID controller was designed for the model through simulation in SIMULINK. The controller is tuning by Ziegler-Nichols method. The simulation work was verified by applying the controller to the real system to achieve the best performance of the system.

Results: The result showed that the output of the system with controller in simulation mode and experimental works were improved and almost similar.

Conclusion/Recommendations: The designed PID controller can be applied to the electro-hydraulic system either in simulation or real-time mode. The self-tuning or automatic tuning controller could be developed in future work to increase the reliability of the PID controller.